

Study Work Book

Directorate of Aerospace Fuels
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Study Work Book

JP-8+100 Rapid Expansion to Fighter & Trainer Aircraft

OBJECTIVES

Explain how JP-8+100 differs from JP-8, why JP-8+100 was developed, and how it works.

Describe the primary components of the +100 additive and the personal safety precautions to be followed when handling this product.

Describe organizational responsibilities for the JP-8+100 Program.

Describe how filter-separators remove sediment and water from fuel and explain how surfactants affect conventional filter-separator systems.

Describe how JP-8+100 is managed to prevent disarming of filter-separators.

Describe how aquacon elements remove water from fuel.

Analyze selected scenarios and explain how the mismanagement of JP-8+100 at your location might disarm filter-separators at other locations.

Calculate the amount of +100 additive required to convert various quantities of JP-8 to JP-8+100.

Describe the installation, calibration, operation and maintenance of the additive injection equipment.

Describe the special handling procedures that are used to preclude dispensing JP-8+100 to aircraft not involved in the program.

Explain the use of the "JP-8+100 Acknowledgment" for transit aircraft.

Analyze selected laboratory scenarios to determine required actions.

REFERENCES TO 42B-1-1

Operating Instructions and Maintenance Manual. Hammonds Model 800IL Additive Injector, Hammond Technical Services, Inc., Houston, Texas

The Wright Laboratory, Aero Propulsion and Power Directorate, has developed a new fuel additive to improve the thermal stability of JP-8. Thermal stress on the fuel results in thermal breakdown which fouls engine nozzles, afterburner spray assemblies, and manifolds. In some instances, fuel degradation changes the spray pattern in the combustor or afterburner leading to damage of engine components, flameouts, and augmentor anomalies. One additive has been approved for operational use (BetzDearborn 8Q462) and others are undergoing the approval process. JP-8 with a thermal stability additive is referred to as JP-8+100 because the additive improves the thermal stability of JP-8 by approximately 100°F, from 325°F to approximately 425°F.

Laboratory tests found the additive reduces fuel fouling of critical engine components by 90 percent. Operational testing of JP-8+100 in F-16A/B resulted in reduced augmentor anomalies, from 23 during the previous year to five during the test year. The unscheduled engine removal rate decreased by 11 percent, increasing the mission capable rate, and avoiding associated maintenance costs. The success of this test led to the expansion of the demonstration program to eleven other installations. The purpose of this plan is to facilitate further expansion to all installations with F-15, F-16, T-37, T-38 and T-1A aircraft. The implementation program is divided into three phases: Phase I, San Juan and CONUS based F-15/16 units with the -100 and -200 series Pratt & Whitney (P&W) engines, T-1A, and T-37/38 units; Phase II, CONUS based units with the P&W -220 and the General Electric (GE) -110 series engines; Phase III, consists of overseas units and units with the GE -129 and the P&W -229 engines. The program is funded under Program Budget Decision (PBD) 714. This PBD provides investment funding of \$3.75 million for FY 97, \$3.4 million for FY 98; and \$3.8 million for FY 99. However, since the PBD also allocates program savings against a funding decrement directed by OSD, the savings expected in Phase I will be validated before proceeding with the remaining phases.

BACKGROUND

Why Increased Thermal Stability is Needed

Integrated aircraft thermal management systems use the fuel as a heat-sink to cool engine lubricating oil, hydraulic fluid, and aircraft subsystems. Increased engine performance, higher heat loads, and reduced fuel loads on modern aircraft have increased the thermal stress of the fuel. Thermal breakdown of the fuel results in coke and gum deposition which foul burner nozzles, afterburner spray assemblies, manifolds, thrust vectoring actuators, fuel controls, pumps, valves, filters, and heat exchangers. Fuel degradation can change the spray pattern in the combustor or afterburner leading to problems of combustion instability, cold starts, flameouts, augmentor anomalies, and damage to engine components.

JP-8+100 Development

To find a solution to the thermal breakdown of fuel, the Wright Laboratory established as a goal the development of an additive or additive package to improve the thermal stability of JP-8 by 100°F, hence the project has been named JP-8+100. Over 350 candidate additives and additive combinations were screened. This screening included the following additive classes: antioxidants, detergents, dispersants, and metal deactivators. Additive candidates were screened in three different tests (Isothermal Corrosion Oxidation Test, Quartz Crystal Microbalance, and the Hot Liquid Process Simulator) and validated in five aircraft/engine fuel system component simulators (Phoenix Rig, Extended Duration Thermal Stability Test, Near Isothermal Fuel Stability Test, Augmentor Simulator, and the Reduced Scale Fuels System Simulator). Detergent and dispersant additives proved effective in reducing coke deposition by solubilizing polar compounds and preventing their reaction to form deposits. Antioxidants, especially in the presence of detergents and dispersants, further reduce deposition. Additionally, metal deactivators also enhance the thermal stability of fuels by chelating trace metals such as copper that increase the rate of deposition. Several additive packages submitted by a number of manufacturers indicate promise. However, as of September 1996, only one additive has been approved for operational use: the BetzDearborn 8Q462 additive. These additives are blends of antioxidants, detergent/dispersants, metal deactivators, and solvents. These additives have been tested in 28 different fuels from military locations worldwide. The thermal stability improvements in this large sample gives a high measure of confidence that the additives will perform satisfactorily in the field.

Materials Compatibility Testing

Some 200 materials which come into contact with fuel have been identified in aircraft fuel systems and engines. These materials can be categorized as: adhesives, bladders, coatings, sealants, composites, fuel filters, gaskets/o-rings, hoses, locking devices, lockwire, potting compounds, electrical wire and insulation, joining metallics-welding/brazing, and explosion suppression foams. Over 180 materials from these categories, beginning with those most likely to have compatibility problems, have been subjected to prolonged, high temperature testing with the fuel and JP-8+100 candidate additives. Following the exposure, the physical and chemical properties of the materials and fuels were tested for materials compatibility. The properties tested included: hardness, elongation, weight loss, cohesion volume swell, tape adhesion, pitting, resistivity laminar shear, peel strength, tensile strength, torque, compression set, LAP shear, graphite, color change, hydroperoxides, acid number, gums, conductivity, and phenols. None of the materials showed any detrimental effects due to the 8Q462 additives package.

Aircraft Engine Simulator Tests

Initial combustion tests of JP-8+100 were conducted in the CFM-56 combustor rig at Wright Laboratory. These tests showed excellent combustion behavior through a wide range of fuel air ratios.

Initial Engine and Flight Testing of Candidate Additives

The fuel was tested in a F100-PW-200 engine in a 50 hour, 224 total accumulated cycles (TAC) test. The engine, prior to testing was “dirty” with visible fouling typical of those found in the

fleet. The JP-8+100 cleaned the lightly fouled components, and improved overall engine performance by opening several small orifices such that the engine could operate at design conditions. Several other engines were tested (T63-A-700, F100-PW-200 (4,000 TAC test), F100-PW-229 and components of the F100-PW-119 engines) with similar improvements. Since these tests were successful, a flight test was conducted at Edwards AFB in September 1994. A F-16 with a F100-PW-220E engine was flown for 4.4 hours through the entire flight envelope including 28 engine restarts. This test found no problems, which cleared JP-8+100 for use in other F-15 and F-16 aircraft.

Operational Validation Testing of JP-8+100

An 18 month operational validation test of JP-8+100 in F-16A/B aircraft (F100-PW-200 engine) has been conducted by the 114th Fighter Squadron, Kingsley Field, Oregon. The results of the Kingsley Field test were dramatic. Augmentor anomalies were reduced from 23 during the previous year to five during the first year of the test. The time between augmentor anomalies increased by 340 percent. Fuel control change outs were reduced by 80 percent, and fuel system maintenance was reduced 70 percent. The unscheduled engine removal rate decreased by 11 percent, increasing the mission capable rate, and avoiding maintenance costs. The success of the Kingsley Field test led to the expansion of the demonstration program to 11 other installations. Further expansion to all installations with assigned F-15, F-16, T-1A, T-37 and T-38 aircraft is planned during FY 97, FY 98, and FY 99.

A one year operational validation of JP-8+100 was being conducted by the 80th FTW, Sheppard AFB TX, with T-37B (J69-T-25 engine) and the T-38 (J85-GE-5 engine). Significant reduction in fuel nozzle (slinger) fouling in the J69 and reduction in augmentor spraybar fouling in the J85 were observed. In addition, smoke/soot emissions were reduced.

Ground Support Equipment Testing

JP-8+100 has been demonstrated to reduce fuel system fouling/coking and maintenance in ground equipment. In tests of the A/M32A-60B ("Dash 60") startcarts with the 152d RECCE Group (ANG), Reno NV, JP-8+100 significantly reduced fuel nozzle fouling and reduced combustor damage and burn-throughs. Savings of \$1,500 per start cart have been estimated.

Additive Components and Material Safety Data

Composition

As mentioned above, the Betz 8Q462 additive is a blend of antioxidants, metal deactivators, detergent/dispersant and solvents. The antioxidant inhibits the oxidation of fuel and the formation of peroxides and insoluble particles. The metal deactivators take up trace metals in the fuel that would otherwise speed-up chemical reactions which result in the formation of degradative products including gums, varnishes and coke. The detergent scrubs deposits from fuel system and engine components and the dispersant keeps these products in solution so they do not settle out of the fuel or plate to surfaces. The solvent prevents the formation of crystals at cold temperatures and makes the additive more soluble in JP-8.

Health Hazardous

A copy of the Material Safety Data Sheet (MSDS) for the Betz 8Q462 is appended to this study guide. If handled improperly the 8Q462 additive could be a moderate health hazard. The Betz 8Q462 is not a carcinogen and poses no special hazards. However, it is a severe irritant to the eyes and can cause moderate skin irritation. Prolonged or repeated skin exposure may cause dermatitis. If inhaled as a vapor, gas, mist or aerosol, the additive may cause irritation to the upper respiratory track. Prolonged exposure may cause dizziness and headache. The Betz additive has a strong odor, so it is unlikely that an adult would be unknowingly exposed. Ingestion of the additive may cause gastrointestinal irritation with possible nausea, vomiting, abdominal discomfort and diarrhea. Small amounts of the additive aspirated during ingestion or vomiting may cause lung injury, possibly leading to death. The Betz 8Q462 combustible liquid with a flash point of 165°F. In summary, the Betz 8Q462 poses many of the same health hazards as JP-8 and the same handling precautions apply. Splash proof chemical goggles or other eye protection and nitrile gloves should be used in situation where the additive may be splashed, sprayed, or spilled. Adequate ventilation should be maintained in areas where the additive is handled to maintain air contaminant below exposure limits. In situations where the use of a respirator is warranted, an air-purifying type respirator with organic vapor cartridges and dust/mist prefilters should be used. As with petroleum products, the additive is minimally reactive to oxidizers and should be kept apart from liquid oxygen.

First Aid Measures

SKIN CONTACT:

Remove contaminated clothing. Wash exposed area with a large quantity of soap solution or water for 15 minutes.

EYE CONTACT:

Immediately flush eyes with water for 15 minutes. Immediately contact a physician for additional treatment.

INHALATION:

Remove victim from contaminated area to fresh air. Apply appropriate first aid treatment as necessary.

INGESTION:

Do not feed anything by mouth to an unconscious or convulsive victim. Do not induce vomiting. Immediately contact physician. Dilute contents of stomach using 3-4 glasses of milk or water.

Accidental Release Measures:

If an accidental release of the additive occurs, ventilate the area and use the specified protective equipment. The spill should be treated as an oil spill. Contain and absorb the additive with an absorbent material. Once the absorbent material is removed, sand or grit should be spread across the area to preclude slipping and falling. Water contaminated with the additive may be sent to a sanitary sewer treatment facility. Because of the NAPHTHALENE content, a spill of 540 gallons or more are reportable under CERCLA and or SARA as an oil spill. There is no RCRA hazardous waste identification number associated with the BETZ 8Q462 additive.

Fire Fighting Instructions:

Use dry chemical, carbon dioxide or foam extinguishing agents—avoid water if possible. Fire fighters should wear the positive pressure self-contained breathing apparatus (full face type).

RESPONSIBILITIES

The Directorate of Aerospace Fuels, SA-ALC/SF, is the Material Group Manager (MGM) for all fuel products and with a designated Integrated Product Team (IPT) (representatives at the GM-15/06 level from the fuels, weapon system, support equipment, and laboratory communities) will manage and implement the rapid expansion of JP-8+100 to all designated units. The initial conversion of JP-8+100 (phase one) will concentrate on fighter and trainer aircraft using truck refueling. In this group, the JP-8+100 can be kept segregated from the normal stocks of JP-8. In the follow-on (phase two) phase, an Air Force-wide conversion would be implemented.

Technical Management. The base level operational assessment provides the information needed to determine program benefits. We have realized some benefits of the +100 additive in the form of better performance and reduced maintenance, but people now become the key to making the program work on a large scale. At base level there are a few organizations that will make the conversion a smooth process. The following will explain the responsibilities of those key organizations.

Fuels Flights. Fuels flights are the handlers of the product and the “gatekeepers” at base level. The fuels flights have the most direct communications with the program managers at SA-ALC/SFT and must keep that line of communication active.

The fuels flights involved in the JP-8+100 program shall:

- a. assist SA-ALC/SFT in establishing on-base additive injection capability
- b. operate, monitor, and maintain injection equipment
- c. manage JP-8+100 inventory and product movement to prevent disarming fuel filtration systems
- d. implement procedures to prevent issuing JP-8+100 to aircraft not involved in the program
- e. report any unusual or unexpected occurrence thought related to JP-8+100 to SA-ALC/SFT

Refueling Maintenance (RFM). As the primary organization responsible for inspection and maintenance of the base fleet of mobile refueling equipment, it is imperative that a constant line of open communication exists between Fuels Management and Refueling Maintenance. The maintenance associated record of maintenance of the mobile fleet will be a key to success or failure of the product conversion.

At bases involved in the JP-8+100 program. Refueling Maintenance shall:

- a. be responsible for the installation of filter-separator elements and water absorbing elements as directed by SA-ALC/SFT
- b. assist SA-ALC/SFT representatives with the installation and testing of new +100 additive injectors as applicable
- c. segregate JP-8 and JP-8+100 product recovered from the refueling fleet to prevent product commingling and the disarming of filter-separator equipment
- d. report any unusual or unexpected occurrence thought related to JP-8+100 to SA-ALC/SFT

Aircraft Maintenance / Transient Alert. It is imperative that we pay attention to the grade of fuel going into the aircraft and the check will be the responsibility of the aircraft maintenance organizations involved in the JP-8+100 conversion. It will also be of the highest importance to pay attention to the performance of the aircraft and document/notify of anything noted good, bad, unusual, unexpected, or interesting.

The Aircraft Maintenance and Transient Alert activities at bases involved shall:

- a. segregate JP-8 and JP-8+100 drained from aircraft to prevent disarming of filter-separator equipment
- b. ensure aircraft AFTO Form 781F is properly annotated to reflect it has been serviced with JP-8+100
- c. check refueling truck markings to ensure aircraft not involved in the program do not get serviced with JP-8+100
- d. assist SA-ALC/SFT in tracking fuel related aircraft and engine performance and maintenance requirement variables to quantify operational and cost differences

Operations. Air Force wide it will be necessary for Operations to understand and emphasize the importance of this program. It is important for our aircrews to have confidence in the equipment and the products used to operate our weapons systems. We will need the help of Operations to keep the special additives in JP-8+100 from causing problems in other systems.

Operations shall:

- a. ensure aircrews are knowledgeable of the JP-8+100 program and the concern for the proper management of defueled JP-8+100
- b. assist SA-ALC/SFT track fuel related aircraft and engine performance and variables
- c. document and report any unusual or unexpected occurrence thought to be related to JP-8+100

Pilots and aircrews of aircraft fueled with JP-8+100 shall ensure maintenance and fuels management personnel at transient locations are aware the aircraft is carrying JP-8+100 prior to servicing (especially defueling) the aircraft.

QUALITY CONTROL PROCEDURES

JP-8+100 must meet the same quality requirements as JP-8 and by now you understand what it means to disarm a filter-separator. Since there is presently no test that detects the presence of the +100 additive in fuel that can be run at base level what do we look for that tells us our filters may be disarmed due to the surfactant quality of the additive?

There will be a few indicators that point to a filter being disarmed. First, and probably the easiest to detect, the coalescing action of the element will not function. Coalescing is the action of separating emulsified water from the fuel. If the elements inside the filter-separator unit are not coalescing water, the water content downstream of the filter will be greater than the allowable 10 parts per million. Fuels laboratory personnel should be familiar with the performance of each filter-separator and be able to detect a subtle change in sample test results.

Second, once the elements in the filter-separator are disarmed, the suspended particulate matter in the fuel passes through the elements. Our fuel systems are known for being fairly clean and suspended particulate in the fuel that is captured during sampling may not exceed the test limits. Once again, it will be up to the laboratory personnel to compare performance of the filter unit to the historical known performance which may point to a disarming problem.

Differential pressure, the difference or delta pressure from the inlet side of the filter unit which is prior to the filter elements, to the outlet side of the filter unit which is after the filter elements, is a good indicator of the health of the unit. If a drop in the delta pressure is noted or if the pressure has been of a steady climb and the curve goes flat indicating no more increase in delta pressure, this may indicate disarming of the elements has taken place.

SUMMARY

As our aircraft become more and more advanced and generate more heat, the use of turbine fuel is expanding. Fuel is not only used to propel the aircraft, but is a primary heat sink used to cool and protect many of the on-board systems. By using the fuel as a heat sink, the increase in fuel operating temperature requires the need for improved thermal stability of the product to prevent deposits and damage to aircraft engine and subsystem components.

The advantages with JP-8+100 is expected to begin in FY98. Every technology involved is in high gear to make the transition to this fuel as smooth as possible. For the next couple of years, until the hardware technology catches up with the chemical technology, it will be the responsibility of everyone involved to join the team effort that can prevent a fuel quality problem.

Attachments:

1. SA-ALC/SFTH Message on JP-8+100 Procedures
2. Betz 8Q460 Injection Rate
3. Additive Injection Table
4. Field Level Requisitioning Procedures for +100 Additive

Additive Injection Table
At
256 Parts Per Million (PPM)

U.S. Gallons	ML	FL OZ.
50	48	2
100	97	3
500	484	16
1000	949	33 Quart
1500	1453	49
2000	1938	66 Half Gal
2500	2422	82
3000	2907	98
3500	3391	115
4000	3876	131 One Gal
4500	4360	147
5000	4845	164 5 Qts
5500	5329	180
6000	5814	197
6500	6298	213
7000	6783	229
7500	7267	246
7600	7364	249
7700	7461	252
7800	7558	256
7900	7654	258
8000	7751	262 Two Gals

NOTE: Conversion Factors for injection at 256 ppm

Quantity (U.S. Gallons) x 96896 = Milliliters (ml)

Quantity (U.S. Gallons) x 032768 = Fluid Ounces (fl oz)

JP-8+100 Conversion Procedures

Subject: Refueler JP-8+100 Conversion

Part 1 - Conversion of Kovatch R-9 and OSHKOSH R-11 refuelers to JP-8+100 Additive

1. Return the refueler to bulk drain the filter separator and sump
2. Inspect the cargo tank and clean free of any visual debris
3. Remove and replace the existing filter separator coalescer elements with new absorption media elements. Reinstall the separator canisters and retain the coalescer middle plates
4. Mark the refueler cargo tank JP-8+100
5. Fill the refueler with JP-8+100 allowing the filter separator to fill slowly by gravity
6. Pressurize the refueler pumping system, inspect for leaks and stop leakage if found
7. Place the refueler in JP-8+100 service
8. Change the filter separator elements upon reaching or nearing 15 psi differential pressure or three years service life. Follow the procedures outlined in steps 1 through 7 as appropriate.

Part II – Conversion of Kovatch R-11 refuelers to JP-8+100

1. RTB and drain the filter separator and cargo tank sump.
2. Inspect and remove any debris from cargo tank.
3. Remove existing filter separator coalescers (6) and replace with absorption media elements.
4. Mark the refueler cargo tank JP-8+100.
5. Fill the refueler with JP-8+100 allowing the filter separator to fill slowly by gravity.
6. Pressurize the refueler pumping system inspect for leaks and correct as needed.
7. Place the refueler in JP-8+100 service.

OPERATIONAL CONCEPT

Special Handling Requirements

Operating our F-15, F-16, and other aircraft on JP-8+100 presents many advantages in performance, reduced maintenance and down-time, and a higher reliability factor. There are also some significant disadvantages. We will have to apply a team effort to manage and overcome these disadvantages.

We provide the cleanest jet fuel in the world to our aircraft. That is a fact, there is no other fuel handling agency in the world that will question that statement. Everyone else uses the US Air Force as a standard when it comes to the quality of jet fuel.

We use American Petroleum Institute (API) 1581 filter-separator elements to filter particulate matter from the fuel and separate water that occurs naturally in all refined petroleum products. Our filters remove particles down to 5 microns. There are 25,400 microns to one inch. Our water separating capability allows us to provide product coming out of the filter-separator with less than 10 parts per million of water. We are not satisfied with one filtration of our product, we require our product to go through at least two filtrations and most of the time our handling and dispensing systems provide three filtrations of fuel before the product is loaded on an aircraft.

In implementing the use of JP-8+100 we base the product on standard JP-8 and inject into it a special "package" of additives. It is these additives that increases the thermal stability of the fuel by approximately 100°F. This increase in the thermal stability reduces coking or deposits forming on high temperature areas. By reducing these deposits, we restore performance and decrease related parts failure and maintenance problems.

The additive packages, while doing great things for our aircraft, does not treat the fuel filter-separator systems kindly. The additives are surface active agents known as surfactants. Surfactants disable or disarm the API 1581 filter-separator elements. To prevent this we must inject the +100 additive as close to the skin of the aircraft as reasonable and definitely downstream of the filter-separator unit. If we allow JP-8+100 to pass through the filter-separator, it will disarm the filter element's ability to filter particulate and separate water from the fuel. Such damage could result in dispensing contaminated fuel to an aircraft.

New Technology Filters

Work is underway to develop new filter-separator technology and while there is a very promising technology being tested, new improved elements may not be available in the quantities we need for up to two years. The new technology elements will be required to perform to our standards when filtering fuel with or without the +100 additives. Once the new elements are available all filter-separators will need to be converted which will require manpower and time to upgrade both our mobile (truck) fleet and our fixed facility filter-separators.

One of the new technology filters being developed is known as the Aquacon. The Aquacon technology filters particulate matter using much the same materials that the present API 1581 elements use but instead of separating water from the fuel and draining it off the Aquacon filters out water by chemically locking in into layers of super-absorbent media. Water removal is not affected by surfactants from the additives. Once captured by the absorbent media, the water cannot be removed. As an Aquacon element reaches its water-holding limit, the media expands rapidly and restricts flow. The restricted flow increases the differential pressure across the filter-separator unit, a reading which will show on the differential pressure gauge indicating to the operator that the unit is in need of a filter change.

For bases servicing JP-8+100, the trucks designated to be +100 units will be upgraded with water absorbing media filter elements.

Fuel Truck Authorizations

Installations involved in the Expansion Program will be handling two grades of aviation product. The increased number of R-11 refueling vehicles that will be generated by applying Table of Allowances (TA 012/019) will not be filled with a new buy of vehicles since the total conversion to JP-8+100 is planned to begin in FY98. Since there are a number of R-9 refueling units scheduled to be taken out of service over the next two years, MAJCOM vehicle managers should consider retaining some to these units for the transition period.

Defueling JP-8+100

We have told you that JP-8+100 is a surfactant and that it will disarm filter-separators. You know that once your filter-separators are disarmed the quality of fuel you are servicing is, by Air Force standards, questionable. So what do you do if you have to defuel an aircraft? As the number of aircraft involved in the Expansion Program grows, so does the potential requirement to have to defuel those aircraft. Along with this grows the potential to contaminate your JP-8 stocks with JP-8+100. If that happens your filter-separators may be disarmed without you knowing it. The same applies to defuels at commercial locations. For this reason JP-8+100 must not be issued to transit aircraft except in an emergency. In such a case the pilot must know about the JP-8+100. This is why an acknowledgment must be signed by the pilot of a transit before it is refueled with JP-8+100. If the aircraft requires defueling at another location, the pilot must inform them of the special handling requirements.

For the civilian airport, this is one of the situations where it is of grave importance that Operations and aircrews are knowledgeable of the fuel on-board and that the servicing aircraft supervisor has properly documented the 781F with the fact that JP-8+100 is the fuel in use.

Likewise, the documentation is of the same importance for our aircraft going to another base. The next location needs to know what they are dealing with or they could unknowingly disarm their entire filtration capability.

Should JP-8+100 need to be defueled, and it will, you can safely blend this product into JP-8 at the rate of no more than 1 to 100. This dilution will thin the surfactant to the point where it will not disable filter elements. Keep in mind the condition of the filter-separator on the truck you used for defuels. That filter will probably be disarmed if it has not been converted to the water absorbing media (Aquacon) elements. Do not defuel JP-8+100 into a hydrant system. The only means for defueling an aircraft with JP-8+100 is the fueling truck.

The Fuels Flight may want to use the method of One-Time defuels using those trucks converted to the water absorbing filter media. Using the method a truck normally used to refuel JP-8+100 can perform a defuel operation and, after product quality is ensured, can continue to refuel JP-8+100. This is not a new procedure and has been an authorized method of defueling for many years. It has not been widely used due to some fuel accountability problems associated with older refueling equipment. With the current truck fleet this method should work well.

Defueled JP-8+100 maybe issued to AGE or to engine test facilities. It may also be reissued to other aircraft involved in the JP-8+100 program.

Recovery of fuel from flightline bowzers has always been a quality problem and JP-8+100 will just complicate things since there is no base-level test to detect the +100 additive yet. Aircraft maintenance organizations must take it seriously. If a bowser is marked JP-8 that is all that can go in it. Bowzers marked as JP-8+100 can be used for either JP-8 or JP-8+100.

INJECTING ADDITIVES

The Ratio. To be most effective, the +100 additive package should be injected into JP-8 at the ratio of 256 parts per million (PPM). This amount provides the optimum results. The additive is expensive (currently about \$23 per gallon). Over use is a waste of money. Under use will not provide the optimum results. To determine how much additive will be needed to improve the thermal stability of a given quantity of fuel lets look at the following logic.

- One PPM = 1 gallon in a million gallons
- One gallon = 128 fluid ounces
- 128 fluid ounces in a million gallons = one PPM
- $128/1,000,000 = 1 \text{ PPM}$
- $128 \text{ } 1,000,000 \text{ converted to a decimal} = 000128/1,000,000 \text{ or } .000128 = 1 \text{ PPM}$

To determine the quantity of additive to be injected use the following method:

- $\text{PPM} \times .000128 \times \text{Qty} = \text{amount of additive to be injected in fluid ounces}$

Example: $256 \text{ PPM} \times .000128 \times 1 \text{ Gallon} = 032768 \text{ ounces per gallon}$

So, now it is time to inject +100 additive into R-11. The R-11 holds 6000 gallons so just apply the following:

- $6000 \text{ Gal} \times .032768 = 196.608 \text{ ounces}$. Then, divide 196.608 by 128 (number of ounces in one gallon) = 1.5 gallons

Apply the same to an R-9:

$$5000 \times .032768 = 163.840 \quad 163.840 / 128 = 1.28 \text{ gallons}$$

The key number to remember is .032768, the multiplier with which you can determine the quantity of additive needed for any quantity of fuel.

The Injector

The injector pump you will most commonly find in use is the Hammonds 800IL. The 800IL is designed to be installed in-line, that is directly in the fuel line where injection of the additive is desired. The 800IL is powered by a positive displacement driver driven by the flowing fuel in the line where the pump is installed. Installation location of the 800IL is very flexible, the pump can be installed nearly anywhere in the fuel system that a line can be opened to accommodate the pump.

Remember, when injecting the +100 additive, you want the injector as close to the receiver aircraft as reasonably possible. Placement of the injector will in most cases be at the truck fillstand. This way product in the truck is injected within the +100 additive as the truck is filled.

Calibration, Operation, and Maintenance

The best guide to the calibration, operation, and maintenance of the Hammonds 800IL is the manual that comes with the pump. We will not duplicate the manual here but there are just a few highlights we want to mention.

The 800IL is accurate within 5% if calibrated and maintained properly. The most important factor to injecting the correct amount of additive into the fuel is to supply the pump with the correct amount of additive. Proper calibration and maintenance of the pump is of key importance. For example, additive leaking from a line or connection or air leaking into a connection will both have negative effects on the accuracy of the pump.

Operation and calibration of the 800IL is the responsibility of the Fuels operator. Before operating and calibrating the 800IL, the operator should be familiar with the Hammonds manual on the pump.

Maintenance responsibility of the 800IL will depend on where it is installed. If the pump is installed at a fixed facility then we will look to Liquid Fuels Maintenance for assistance in maintaining the 800IL. If the pump is non-installed, mobile, or capable of being used with mobile tactical fueling systems, maintenance is the responsibility of the Fuels Flight.

Special Handling Procedures

The Fuels Flights involved in the Expansion Program will have to comply with some special handling procedures that will be used to avoid servicing JP-8+100 to aircraft not in the program. Some of these procedures may seem somewhat routine but you can't think of them that way because we are dealing with the potential to disable our filtration systems which are our primary means of product quality assurance.

- a. Maintain separate dedicated refueling fleets by grade of product. Dedicate refuelers to JP-8 to be used solely for that grade to service home station or transit aircraft not involved in the JP-8+100 program. These refuelers will handle only JP-8 without the +100 additive.
- b. Maintain a dedicated refueling fleet for JP-8+100. These vehicles will be dedicated to servicing JP-8+100 aircraft in the Expansion Program.
- c. Clearly mark refueling vehicles with the product grade. Vehicles must be marked either JP-8 or JP-8+100.
- d. Establish clear markings on refueling vehicle clipboards. Ensure clipboards for jet fuel servicing are marked either JP-8 or JP-8+100.
- e. Utilize product lock control system. Each refueling vehicle must be disabled with the use of a padlock to prevent servicing the wrong grade of fuel. The key to the padlock should be attached to the clipboard that corresponds to that truck. The padlock is to be unlocked by the operator at the time of servicing and locked after servicing is complete.
- f. The use of the fuel grade verification on AF Form 1994/1995 for all transient aircraft all jet fuel issues.
- g. Ensure all aircraft identaplates are embossed with the current fuel grade and that grade is reflected in the AFTO 781F.
- h. JP-8+100 will not be issued to Navy or Marine Corps aircraft unless operational necessity dictates. If issue of JP-8+100 is unavoidable:
 - (1) The pilot will be informed and will sign an acknowledgment prior to the servicing.
 - (2) Within 24 hours of servicing, FAX a signed copy of the acknowledgment to NAVAIR AIR 4.4.5, DSN 442-7532 / COM (609) 538-6532
 - (3) Within 24 hours of servicing, FAX a signed copy of the acknowledgment to SA-ALC/SFTH, DSN 945-9964 / COM (210) 925-9964
- i. JP-8+100 shall not be issued to contract carriers, commercial aircraft, or foreign military or commercial aircraft unless operational or emergency requirements dictate. If issue of JP-8+100 is necessary:
 - (1) The pilot will sign an acknowledgment and liability release.
 - (2) FAX a signed copy of release to SA-ALC/SFTH, DSN 945-9964, COM (210) 925-9964.

JP-8+100 Acknowledgment

In continuity to stress the critical need to ensure we do all we can to prevent the disarming of filter-separators and risk servicing contaminated fuel to aircraft, a requirement has been established for an acknowledgment to be initiated each time a transit aircraft not in the Expansion Program is serviced with JP-8+100. Extensive materials testing and flight testing show that JP-8+100 causes no harmful effects to aircraft or engine subsystems.

The thermal stability additive in JP-8+100 can; however, disarm conventional filter-coalescers in the fuel distribution systems.

The JP-8+100 Acknowledgment is required to be read and signed by the pilot of a transit aircraft prior to the aircraft being refueled. The Acknowledgment, as stated prior, must be FAXED to SA-ALC/SFTH, the Air Force Fuels Technical Assistance Team, who will in-turn notify the MAJCOM or agency responsible for the aircraft. A copy of the acknowledgment, which contains special handling instructions for JP-8+100, must go with the pilot to the next destination/home station.

NOTE

The practice of refueling aircraft not in the Expansion Program with JP-8+100 must be held to an absolute minimum and should only be done in a situation of operational necessity.

JP8+100 ACKNOWLEDGMENT

******* REQUIRED PRIOR TO SERVICING EACH TRANSIENT AIRCRAFT*******

JP8+100 INCLUDES AN ADDITIVE THAT ENHANCES THE THERMAL STABILITY CHARACTERISTICS OF THE FUEL. THERMAL STRESS ON FUEL CAUSES BREAKDOWN WHICH FOULS ENGINE NOZZLES, AFTER BURNER SPRAY ASSEMBLIES AND MANIFOLDS. EXTENSIVE MATERIALS COMPATIBILITY TESTS USING AIRCRAFT ENGINE SIMULATOR, ENGINE TEST CELLS AND INFLIGHT TESTS HAVE BEEN COMPLETED WITH JP8+100 AND NO HARMFUL EFFECTS IDENTIFIED. THE THERMAL STABILITY ADDITIVE IN JP8+100 DISARMS FILTER-COALESCER ELEMENTS IN FUEL DISTRIBUTION SYSTEMS. FOR THIS REASON, THE ADDITIVE IS INJECTED ONBASE AND DOWN STREAM FROM THE FILTER-COALESCER AT THE TRUCK FILLSTAND. THE FILTER-COALESCERS ON THE JP8+100 REFUELING TRUCKS HAVE BEEN REPLACED WITH SPECIAL WATER-ABSORBING FILTER ELEMENTS. BECAUSE OF THIS, AIRCRAFT NOT INVOLVED IN THE JP8+100 PROGRAM SHOULD NOT BE SERVICED WITH JP8+100 UNLESS OPERATIONAL NECESSITY DICTATES. JUSTIFY THE OPERATIONAL NECESSITY REQUIRING THE ISSUE OF JP8+100 IN THE REMARKS SECTION.

******* CAUTION*******

JP8+100 DEFUELED FROM AIRCRAFT REQUIRES SPECIAL HANDLING TO PRECLUDE THE DISARMING OF CONVENTIONAL FILTER-COALESCERS IN FUEL STORAGE AND SERVING EQUIPMENT. IF JP8+100 IS DEFUELED AND NOT HANDLED PROPERLY, THE ABILITY OF THE REFUELING EQUIPMENT TO FILTER SEDIMENT AND COALESCE AND SEPARATE WATER FROM FUEL COULD BE JEOPARDIZED. FUELS MANAGEMENT PERSONNEL MUST BE INFORMED PRIOR TO DEFUELING AN AIRCRAFT THAT HAS BEEN FUELED WITH JP8+100. DEFUELED JP8+100 SHOULD BE REISSUED TO THE SAME AIRCRAFT, TO AGE EQUIPMENT, OR TO ENGINE TEST STANDS. IF THE DEFUEL TRUCK IS EQUIPPED WITH COALESCER ELEMENTS, THE ELEMENTS MUST BE CHANGED PRIOR TO RETURNING TO FUEL SERVING. IF NECESSARY, JP8+100 CAN BE TRANSFERRED TO JP8 OR JET A BULK STORAGE AT A BLENDING RATIO OF ONE PART JP8+100 TO ONE HUNDRED PARTS OF JP8 OR JET A.

BASELINE ISSUING PRODUCT		PHONE (DSN/COMM)	
AIRCRAFT TYPE		TAIL NUMBER	
GALLONS OF JP8+100	HOME STATION	MILITARY SERVICE	
PLOTS ACKNOWLEDGEMENT (Printed and Signature)		DATE	
REMARKS			
DISTRIBUTION: ISSUING ORGANIZATION WILL MAINTAIN ONE COPY GIVE ONE COPY TO THE PLOT FAX ONE COPY TO THE DIRECTORATE OF AEROSPACE FUELS, TECHNICAL ASSISTANCE TEAM, DSN 9459864 FAX ONE COPY TO THE APPROPRIATE SERVICE AGENCY WITHIN 24 HOURS USAFMAJCOM/FUELS OFFICE USN NAVY PETROLEUM OFFICE, COM 301-757-3614 USA ARMY PETROLEUM OFFICE, DSN 977-4230			

**FIELD LEVEL
REQUISITIONING PROCEDURES
FOR +100 ADDITIVE**

CAUTION: WHEN USING THESE PROCEDURES TRANSACTIONS MUST BE OFF-LINE. DO NOT PROCESS ANY TRANSACTION THROUGH THE SBSS COMPUTER SYTEM.

Using these procedures requires close coordination between the Fuels (POL) Flight, Stock Control and Warehouse personnel at your activity.

The Fuels personnel must let Stock Control know the **NSN (Stock Number), Unit of Issue, and Quantity** of the +100 additive required

Stock Control must then Off-line the requisition using the Defense Emergency Supply Expert System (DESEX) to S9G/DSCR Richmond VA. If DESEX is unavailable, Stock Control can use any means available to send the requisition to S9G/DSCR Richmond VA.

Requisition should specify:

- 1. Use your FB number in the Requisition, use the current Julian date, and Your Bases's Off-Line Requisition Serial Number.**
- 2. The Demand Code (CC 44) should be a "R".** This will allow DSCR to build demand data on this item.
- 3. CC 45-50 should be left blank.**
- 4. Signal Code CC 51 MUST be "C".** Ship to requisitioner. Bill to addressee designated by the Fund Code in cc 52-53.
- 5. Fund Code in CC 52-53 MUST be "FG".** This is what will tell S9G to Bill DFSC for this requisition.
- 6. Priority should be "02" (unless your activity carries a requisition priority of 01).** Required delivery date should be either "999" or "N05". "999" for overseas bases and "N05" for CONUS Bases.
- 7. Remember – DO NOT process a "SPR" into the computer (SBSS) for this transaction.**
- 8. Notify your Warehouse personnel to expect this requisition and when it arrives NOT to process through the SBSS.**

REMEMBER TO USE SIGNAL CODE "C" AND FUND CODE "FG". IF YOUR DON'T YOUR BASE WILL BE BILLED FOR THE ADDITIVE INSTEAD OF DFSC.

Item Manager point of contacts at S9G are:

- | | | | | |
|--------------------|------------------------|--------------------------------|-----------------|--------------|
| • 6850 01 432 7871 | Betz Process Chemicals | 5 Gallon Container | Patrice Winbush | DSN 695-4401 |
| | SPEC AID 8Q462 | | | |
| • 6850 01 432 7840 | Betz Process Chemicals | 54 Gallon Drum | George Petzer | DSN 695-5051 |
| | SPEC AID 8Q462 | | | |
| • 6850 01 432 7761 | Betz Process Chemicals | 280 Gallon | Patrice Winbush | DSN 695-4401 |
| | SPEC AID 8Q462 | Re-useable Semi-bulk container | | |
| • 6850 01 432 7105 | Betz Process Chemicals | Bulk | Lt Meagher | DSN 695-4594 |
| | SPEC AID 8Q462 | | | |

Your activity must use these procedures so that Stock Fund and O&M Funds are not expended. Any improvements to these procedures can be sent to Mr Michael Green P.E. DSN 945-4617.

PROCEDURES FOR RECEIPT OF +100 ADDITIVE

1. Once the JP-8+100 additive arrives in your warehouse, Warehouse personnel should know **Not to Process through the SBSS.**
2. Warehouse personnel should coordinate with Stock Control to verify NSN, Unit of Issue, Quantity, and Requisition Number.
3. Warehouse personnel should then notify Fuels personnel JP-8+100 additive has arrived and arrange delivery.
4. Warehouse personnel should prepare a **DO NOT POST** Issue Document for the property received. This Issue Document should be signed by Fuels personnel upon delivery of the JP-8+100 additive.
5. Warehouse personnel should then forward all receiving paper work and issue document to the Document Control Section for filing in the DO NOT POST file.

THIS WILL COMPLETE THE AUDIT TRAIL

REMEMBER, DO NOT PROCESS ANY TRANSACTION ASSOCIATED WITH THE +100 ADDITIVE THROUGH THE SBSS COMPUTER SYSTEM.

Your activity must use these procedures so that Stock Fund and O&M Funds are not expended. Any improvements to these procedures can be sent to Mr Michael Green P.E. DSN 945-4617.

DOD Hazardous Materials Information System
DoD 6050.5-LR
AS OF October 1997
Proprietary Version - For U.S. Government Use Only

FSC: 6850
Niin: 014327761
Manufacturer's CAGE: ORDP2
Part No. Indicator: A
Part Number/Trade Name: SPEC-AID 8 Q 462

General Information

Item Name: ADDITIVE, THERMAL STABILIZER, JET FUEL
Company's Name: BETZ LABORATORIES INC/BETZ DEARBORN
Company's Street: 9669 GROGANS MILL RD
Company's P.O. Box:
Company's City: SPRING/WOODLANDS
Company's State: TX
Company's Country: US
Company's Zip Code: 77380
Company's Emerg Ph #: 800-877-1940
Company's Info Ph #: 713-367-2442
Distributor/Vendor # 1:
Distributor/Vendor # 1 Cage:
Distributor/Vendor # 2
Distributor/Vendor # 2 Cage:
Distributor/Vendor # 3:
Distributor/Vendor # 3 Cage:
Distributor/Vendor # 4
Distributor/Vendor # 4 Cage:
Safety Data Action Code:
Safety Focal Point: D
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 003
Status: SE
Date MSDS Prepared: 05SEP96
Safety Data Review Date: 13JAN97
Supply Item Manager: CX
MSDS Preparer's Name: UNKNOWN
Preparer's Company:
Preparer's St or P.O. Box:
Preparer's City:
Preparer's Zip Code:
Other MSDS Number:
MSDS Serial Number: CCKWB
Specification Number: NONE
Spec Type, Grade, Class: NONE
Hazard Characteristic Code: F8
Unit of Issue: CO
Unit of Issue Container Qty: 280 GAL
Type of Container: CONTAINER
Net Unit Weight: 2099.2 LBS
NRC/State License Number: NOT RELEVANT
Net Explosive Weight: N/R

Report for NIIN: 014327761

Net Propellant Weight-Ammo: N/R
Coast Guard Ammunition Code: N/R

Ingredients/Identity Information

Proprietary: NO
Ingredient: HEAVY AROMATIC NAPHTHA (SOLVENT NAPHTHA)
Ingredient Sequence Number: 01
Percent: UNKNOWN
Ingredient Focal Point: D
NIOSH (RTECS) Number: WF3100000
CAS Number: 64742-94-5
OSHA PEL: 5 MG/M3 AS OIL MIST
ACGIH TLV: 5 MG/M3 AS OIL MIST
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: 1, 2, 4-TRIMETHYLBENZENE (SARA 313)
Ingredient Sequence Number: 02
Percent: UNKNOWN
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: DC3325000
CAS Number: 95-63-6
OSHA PEL: 25 PPM
ACGIH TLV: 25 PPM; 9596
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: TRADE SECRET COMPONENT: TSRN 125438-5273P AND TSRN 125438-5266P
Ingredient Sequence Number: 03
Percent: UNKNOWN
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: 1003232TS
CAS Number:
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: NAPHTHALENE (SARA 313) (CERCLA)
Ingredient Sequence Number: 04
Percent: UNKNOWN
Ingredient Action Code:
Ingredient Focal Point: D
NIOSH (RTECS) Number: QJ0525000
CAS Number: 91-20-3
OSHA PEL: 10 PPM
ACGIH TLV: 10 PPM; 9596
Other Recommended Limit: NONE RECOMMENDED

Physical/Chemical Characteristics

Appearance and Odor: AMBER TO BROWN LIQUID - STRONG ODOR

Boiling Point: UNKNOWN

Melting Point: -60°F, -51°C

Vapor Pressure (MM Hg/70°F): <5

Vapor Density (Air=1): >1

Specific Gravity: 0.900

Decomposition Temperature: UNKNOWN

Evaporation Rate and Ref: <1 (ETHER=1)

Solubility In Water: INSOLUBLE

Percent Volatiles By Volume: N/K

Viscosity: 18 CPS @ 70°F

pH: N/R

Radioactivity: NOT RELEVANT

Form (Radioactive Matl):

Magnetism (Milligauss): N/P

Corrosion Rate (IPY): UNKNOWN

Autoignition Temperature: N/K

Fire and Explosion Hazard Data

Flash Point: 165°F, 74C

Flash Point Method: PMCC

Lower Explosive Limit: UNKNOWN

Upper Explosive Limit: UNKNOWN

Extinguishing Media: USE CARBON DIOXIDE, SAND, FOAM/DRY CHEMICAL. AVOID WATER. WATER SPRAY MAY BE USED TO KEEP FIRE EXPOSED CONTAINERS COOL.

Special Fire Fighting Proc: WEAR PROTECTIVE CLOTHING AND NIOSH-APPROVED SELF-CONTAINED BREATHING APPARATUS OPERATED IN POSITIVE PRESSURE MODE.

Unusual Fire and Expl Hazrds: CONTAINERS CAN RUPTURE. MAY YIELD ELEMENTAL OXIDES.

Reactivity Data

Stability: YES

Cond To Avoid (Stability): EXCESSIVE HEAT, OPEN FLAMES

Materials To Avoid: STRONG OXIDIZING AGENTS

Hazardous Decomp Products: MAY FORM CARBON MONOXIDE, CARBON DIOXIDE, SMOKE, FUMES, OTHER ELEMENTAL OXIDES.

Hazardous Poly Occur: NO

Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: LD50 (ORAL, RAT) IS NOT KNOWN.

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: NO

Route Of Entry - Ingestion: NO

Health Haz Acute and Chronic: TARGET ORGANS: EYE, SKIN, CNS, RESPIRATORY & GI TRACTS.

ACUTE - EYES: SEVERE IRRITATION. SKIN: MAY IRRITATE MODERATELY. MAY CAUSE DERMATITIS. INHALE: HIGH VAPOR/AEROSOL CONCENTRATIONS MAY CAUSE RESPIRATORY IRRITATION & CNS EFFECTS. ORAL: MAY CAUSE VOMITING, IRRITATION OF GI TRACT. ASPIRATION HAZARD. CHRONIC - DERMATITIS.

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: NONE

Signs/Symptoms of Overexp: IRRITATION, NAUSEA, HEADACHE, VOMITING, DIARRHEA, TEARING, DIFFICULT BREATHING, DIZZINESS, UNCONSCIOUSNESS, DROWSINESS, DRY SKIN, DERMATITIS, BLURRED VISION

Med Cond Aggravated By Exp: INDIVIDUALS WITH PRE-EXISTING DISEASES OF THE EYE, SKIN, RESPIRATORY TRACT MAY HAVE INCREASED SUSCEPTIBILITY TO THE TOXICITY OF EXCESSIVE EXPOSURES.

Emergency/First Aid Proc: GET MEDICAL HELP IF SYMPTOMS PERSIST.

INHALED: REMOVE TO FRESH AIR. PROVIDE CPR/OXYGEN IF NEEDED. EYES: FLUSH WITH WATER FOR 15 MINUTES, HOLDING EYELIDS OPEN. SKIN: WASH WITH SOAP&WATER.

ORAL: DO NOT INDUCE VOMITING. IF CONSCIOUS, DRINK 3-4 GLASSES OF MILK/WATER.

SEEK PROMPT MEDICAL ATTENTION. IF SPONTANEOUS VOMITING OCCURS, KEEP HEAD BELOW HIPS TO PREVENT ASPIRATION OF VOMITING INTO LUNGS.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: WEAR PROTECTIVE EQUIPMENT. ELIMINATE SOURCES OR IGNITION. VENTILATE AREA. PICK UP SPILL WITH NON-FLAMMABLE ABSORBENT MATERIAL SUCH AS SAND. PLACE IN CONTAINER FOR DISPOSAL. PREVENT LIQUID FROM ENTERING SEWERS, WATERWAYS.

Neutralizing Agent: NOT RELEVANT

Waste Disposal Method: DISPOSE OF IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS. INCINERATION, REUSE OR RECYCLING IS RECOMMENDED. Precautions-Handling/

Storing: STORE IN COOL, VENTILATED AREA AWAY FROM SOURCES OF IGNITION & STRONG OXIDIZING AGENTS. BOND CONTAINERS DURING FILLING OR DISCHARGING IF ABOVE 165°F.

Other Precautions: AVOID BREATHING VAPORS. DO NOT GET IN EYES, ON SKIN OR ON CLOTHING. WASH THOROUGHLY AFTER HANDLING AND BEFORE EATING OR DRINKING. REMOVE CONTAMINATED CLOTHING PROMPTLY. LAUNDER BEFORE REUSE.

KEEP OUT OF REACH OF CHILDREN.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: WEAR PROTECTIVE EQUIPMENT. ELIMINATE SOURCES OF IGNITION. VENTILATE AREA. PICK UP SPILL WITH NON-FLAMMABLE ABSORBENT MATERIAL SUCH AS SAND. PLACE IN CONTAINER FOR DISPOSAL. PREVENT LIQUID FROM ENTERING SEWERS, WATERWAYS.

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Control Measures

Respiratory Protection: NONE REQUIRED WHERE ADEQUATE VENTILATION CONDITIONS EXISTS. IF AIRBORNE CONCENTRATION IS HIGH, WEAR A NIOSH-APPROVED ORGANIC VAPOR RESPIRATOR OR AIR-SUPPLIED RESPIRATOR.

Ventilation: ADEQUATE. Protective Gloves: NITRILES, PVC FOR REPEATED CONTACT

Eye Protection: SAFETY GLASSES/CHEMICAL SPLASH GOGGLES

Other Protective Equipment: SAFETY SHOWER AND EYE WASH FOUNTAIN SHOULD BE LOCATED

NEARBY. WEAR APPROPRIATE PROTECTIVE CLOTHING FOR RISK OF EXPOSURE. Work Hygienic Practices: OBSERVE GOOD PERSONAL HYGIENE PRACTICES AND RECOMMENDED PROCEDURES.

Suppl. Safety & Health Data:

[illegible]

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[illegible]

The filter elements used in support of the JP-8+100 program are installed in R11 refueler filter separators. Below source information is provided on filter element NSN 4330-01-439-2319 for the old R11 (Oshkosh) and on filter element 4330-01-439-2314 for the new R11 (Kovatch).

NSN: 4330-01-439-2319

- Approved Sources:
1. Velcon Filters FSCM 13573
P/N: ACI-44001C
Description: Aquacon Filter Element
Cost: approx \$99.25 each (\$87.25/60+)(includes shipping within CONUS)
(15) filter elements required per (Oshkosh) R11 refueler
 2. Facet International FSCM 87405
P/N: GNG-440
Cost: competitive, shipping quoted separately
(15) filter elements required per (Oshkosh) R11 refueler

NSN: 4330-01-439-2314

- Approved Sources:
1. Velcon Filters FSCM 13573
P/N: ACI-63301CTB
Description: Aquacon Filter Element
Cost: approx \$142.80 each (includes shipping within CONUS)
(6) filter elements required per (Kovatch) R11 refueler
 2. Facet International FSCM 87405
P/N: FGI-633SB
Cost: competitive, shipping quoted separately
(6) filter elements required per (Kovatch) R11 refueler

Source Information:

1. **Velcon Filters FSCM 13573**
4525 Centennial Blvd
Colorado Springs, CO 80919-3350
Phone: (719) 528-7250 Fax (719) 531-5690
POC: Mr Rick Waite//Petroleum Products Manager
2. **Facet International Inc FSCM 87405**
9910 East 56th Street North
P.O. Box 50096
Tulsa, OK 74150-0096
Phone: (918) 272-8733 or (800) 223-9910 Fax (918) 272-8787
POC: Mr Charles E. Lindsey//Government Program Manager

Location

1 FW LANGLEY AFB VA
12 FTW RANDOLPH AFB TX
14 FTW COLUMBUS AFB MS
71 FTW VANCE AFB OK
80 FTW SHEPPARD AFB TX
102 FW OTIS ANGB MA
104 FG BARNES ANGB WESTFIELD MA
118 RMS NASHVILLE METRO APRT TN
119 FW HECTOR FLD ND
120 FG GREAT FALLS IAP MT
123 AW STANDIFORD FLD LOUISVILLE KY
125 FG JACKSONVILLE IAP FL
131 FW LAMBERT FLD ST LOUIS IAP MO
142 FG PORTLAND IAP OR
147 FG ELLINGTON ANGB TX
147 FTW LAUGHLIN AFB TX
148 FG DULUTH IAP MN
149 FW KELLY ANGB TX
158 FG BURLINGTON IAP VT
159 FW USNAS JRB NEW ORLEANS LA
173 FW KINGSLEY FLD OR
178 FG SPRINGFIELD ANGB OH
325 FW TYNDALL AFB FL
377 ABW KIRTLAND ANG/AFB NM

HOW TO RETURN AN EMPTY 8Q462 BIN TO BETZDEARBORN

- 1) Note the Bin Identification Number. It is usually a 4-5 digit number embossed, into the bin metal, near the foot of the bin.
- 2) Contact Dan Glesmann, of BetzDearborn, and advise him which bin(s) are ready for return.

Fax 510-825-3913
Phone 510-813-4050
Pager 800-689-4389

- 3) Within two weeks of notification, BetzDearborn will either retrieve the bin with one of their trucks, or via a common carrier. There is no cost to the USAF.

SA ALC KELLY AFB TX//SFT//

HQ AETC RANDOLPH AFB TX//LGS/LG/DO//

ANGRC ANDREWS AFB MD//LGS/LG/DO//

HQ AFMC WRIGHT PATTERSON AFB OH//LGS/LG/DO//

HQ ACC LANGLEY AFB VA//LGS/LG/DO//

HQ AMC SCOTT AFB IL//LGS/LG/DO//

HQ AFRC ROBINS AFB GA//LGS/LG/DO//

HQ AFSOC HURLBURT FLD FL//LGS/LG/DO//

HQ AFSPC PETERSON AFB CO//LGS/LG/DO//

INFO HQ USAF WASHINGTON DC//ILSP//

DIR USAPC NEW CUMBERLAND PA//SATPC-Z//

DIRMETCB FT BELVOIR VA//AMSTA-RBF//

NAVPETOFF FT BELVOIR VA//NPO//

366TRS SHEPPARD AFB TX//TSIF//

345TRS LACKLAND AFB TX//TTLO//

UNCLAS

SUBJECT: JP-8+100 UPDATE

REF: SA-ALC/SFT MSG 201537Z MAY 97

1. THE FOLLOWING LOCATIONS HAVE CONVERTED AND ARE CURRENTLY OPERATION
BASE ASSIGNED AIRCRAFT ON JP-8+100: LAUGHLIN AFB TX, JACKSONVILLE

JIM YOUNG, QUAL ASSURANCE SPEC
SA-ALC/SFTH, 54617

NICK J. MAKRIS/SFT/56431
CRC: 2988

UNCLASSIFIED

161835ZJUL97

02 05 161835Z MONTH JUL 97 RR RR UUUU

SFT

ANGB FL, SHEPPARD AFB TX, ELLINGTON ANGB TX, OTIS ANGB MA, BURLINGTON ANGB VT, BARNES ANGB MA, LOUISVILLE ANGB KY, NASHVILLE ANGB TN, SPRINGFIELD ANGB OH, PORTLAND ANGB OR, KINGSLEY FIELD ANGB OR, AND KIRTLAND ANG/AFB NM. LOCATIONS SCHEDULED TO CONVERT TO JP-8+100 BY THE END OF FY 97 ARE: LANGLEY AFB VA, LUKE AFB AZ, TYNDALL AFB FL, TUCSON ANGB AZ, GREAT FALLS ANGB MT, KELLY ANGB TX, DULUTH ANGB MN, SAN JUAN ANGB PR, ST LOUIS ANGB MO, NEW ORLEANS ANGB/ARB LA, VANCE AFB OK, COLUMBUS AFB MS, AND RANDOLPH AFB TX. MOST LOCATIONS WILL RETAIN A LIMITED CAPABILITY TO SUPPORT TRANSIENT AIRCRAFT JP-8 REQUIREMENTS. HOWEVER, BECAUSE OF LIMITED RESOURCES SOME AND LOCATIONS MAY NOT BE ABLE TO SUPPORT TRANSIENTS AND INTO-PLANE CONTRACT SERVICE MAY BE NECESSARY. AIRCREWS SHOULD BE ADVISED TO REVIEW NOTAMS DURING FLIGHT PLANNING.

2. AS THE NUMBER OF UNITS OPERATING AIRCRAFT ON JP-8+100 GROWS, THE POTENTIAL TO SERVICE A TRANSIENT AIRCRAFT (NOT INVOLVED IN THE PROGRAM) WITH JP-8+100 STEADILY INCREASES. TO PRECLUDE THE INADVERTENT SERVICING OF TRANSIENT AIRCRAFT WITH JP-8+100, BASE-LEVEL ACTIVITIES MUST ESTABLISH SPECIFIC RESPONSIBILITIES FOR EACH FUNCTIONAL AREA INVOLVED IN FUEL SERVICING OPERATIONS. AT MINIMUM, FUEL FLIGHTS INVOLVED IN THE JP-8+100 PROGRAM MUST: OPERATE,

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MONITOR, NAD MAINTAIN THE INJECTION EQUIPMENT TO ENSURE THE PROPER INJECTION RATIO; CONDUCT QUALITY CONTROL SAMPLING PER THE JP-8 REQUIREMENTS IN T.O. 42B-1-1; AND MANAGE JP-8+100, INCLUDING DEFUELS, TO PRECLUDE DISARMING FILTER-SEPARATOR SYSTEM. FUELS FLIGHTS NOT INVOLVED IN THE JP-8+100 PROGRAM MUST: ENSURE JP-8+100 DEFUELED FROM TRANSIENT AIRCRAFT DOES NOT DISARM FUEL SYSTEM FILTER-SEPARATORS. AIRCRAFT MAINTENANCE AT LOCATIONS DISPENSING JP-8+100 MUST MANAGE JP-8+100 PRODUCT DRAINED FROM AIRCRAFT TO PRECLUDE DISARMING FILTER-SEPARATOR EQUIPMENT; ENSURE AFTO FORMS 781 DEPICT AIRCRAFT PARTICIPATING IN THE JP-8+100 PROGRAM. IF APPLICABLE. THE OPERATIONS FUNCTION MUST: ENSURE PILOTS ARE KNOWLEDGEABLE OF THE JP-8+100 PROGRAM AND THE CONCERN REGARDING THE PROPER MANAGEMENT OF DEFUELED JP-8+100; ENSURE PILOTS OF AIRCRAFT FUELED WITH JP-8+100 ADVISE MAINTENANCE AND FUELS MANAGEMENT PERSONNEL AT TRANSIENT LOCATIONS OF THEIR FUEL TYPE PRIOR TO ANY AIRCRAFT DEFUELS.

3. OTHER SPECIFICS AND MANDATORY SPECIAL HANDLING PROCEDURES ASSOCIATED WITH THE JP-8+100 PROGRAM ARE:

A. THE THERMAL STABILITY ADDITIVE IN JP-8+100 CAN DISARM CONVENTIONAL FILTER-COALESCERS IN FUEL DISTRIBUTION SYSTEMS AND POSSIBLY LEAD TO AIRCRAFT BEING SERVICED WITH FUEL CONTAINING EXCESSIVE WATER AND SEDIMENT CONTENT.

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B. THE FILTER-COALESCERS ON THE JP-8+100 REFUELING TRUCKS HAVE BEEN REPLACED WITH SPECIAL WATER-ABSORBING FILTER ELEMENTS.

C. AIRCRAFT NOT INVOLVED IN THE JP-8+100 PROGRAM SHOULD NOT BE SERVICED WITH JP-8+100 UNLESS OPERATIONAL NECESSITY DICTATES.

D. JP-8+100 DEFUELED FROM AIRCRAFT REQUIRES SPECIAL HANDLING TO PRECLUDE DISARMING CONVENTIONAL FILTER-COALESCERS IN FUEL STORAGE AND SERVICING EQUIPMENT.

E. IF JP-8+100 IS DEFUELED AND NOT HANDLED PROPERLY, THE ABILITY OF THE REFUELING EQUIPMENT TO FILTER SEDIMENT AND COALESCE/SEPARATE WATER FROM FUEL COULD BE JEOPARIZED.

F. FUELS MANAGEMENT PERSONNEL MUST BE INFORMED PRIOR TO DEFUELING AN AIRCRAFT CARRYING JP-8+100.

G. DEFUELED JP-8+100 SHOULD BE RETURNED TO THE SAME AIRCRAFT, TO AGE EQUIPMENT, OR TO ENGINE TEST STANDS.

H. IF A DEFUEL TRUCK EQUIPPED WITH COALESCER ELEMENTS IS EXPOSED TO JP-8+100, THE ELEMENTS MUST BE CHANGED PRIOR TO RETURNING THE VEHICLE TO JP-8 SERVICE.

I. JP-8+100 CAN BE RETURNED TO JP-8+100 OR JET A AT A BLENDING RATIO OF ONE PART JP-8+100 TO ONE HUNDRED PARTS OF JP-8 OR JET A.

4. A VERY IMPORTANT DOCUMENT DEVELOPED SPECIFICALLY FOR THE JP-8+100 PROGRAM IS THE AFTO FORM 148 (JP-8+100 ACKNOWLEDGEMENT, AUG 96

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EF-V1). THE AFTO 148 WAS DESIGNED TO ENSURE TRANSIENT AIRCREWS WERE AWARE OF THE IMPLICATIONS ASSOCIATED WITH JP-8+100 AND TO DOCUMENT THE ACKNOWLEDGEMENT OF SUCH FUEL RECEIPTS. ACCORDINGLY, PRIOR TO SERVICING A TRANSIENT AIRCRAFT WITH JP-8+100, THE PILOT MUST BE BRIEFED ON THE JP-8+100 PROGRAM PARTICULARS AND CERTIFY UNDERSTANDING BY SIGNING THE FORM.

5. JP-8+100 SHALL NOT BE ISSUED TO NAVY/MARINE CORPS AIRCRAFT, CONTRACT CARRIERS, COMMERCIAL AIRCRAFT, OR FOREIGN MILITARY OR COMMERCIAL AIRCRAFT UNLESS OPERATIONAL OR EMERGENCY REQUIREMENTS DICTATE. IF AN AIRCRAFT SERVICING WITH JP-8+100 IS UNAVOIDABLE, THE AIRCRAFT PILOT SHALL BE INFORMED AND SHALL SIGN AN AFTO FORM 148 PRIOR TO THE FUELING OPERATION. A COPY OF ALL SIGNED AFTO FORM 148 SHALL BE TELEFAXED TO SA-ALC/SFTH AT DSN 945-9964 OR COMMERCIAL NUMBER (210) 925-9964 WITHIN 24 HOURS AFTER SUCH SERVICING. LIKEWISE, NAVAIR AIR 4.4.5 REQUIRES A TELEFAX COPY OF THE AFTO FORM 148, DSN 442-7532 (COM 609-538-6532)) FOR NAVY/MARINE AIRCRAFT SERVICING.

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ZYUW

SA ALC KELLY AFB TX//SFT//

USAF WASHINGTON DC//ILSP//

AETC RANDOLPH AFB TX//LGSF//

AMC SCOTT AFB IL//LGSF//

USSTRATCOM OFFUTT AFB NE//J442//

HQ AFSPACECOM PETERSON AFB CO//LGSF//

HQ ACC LANGLEY AFB VA//LGSSF//

HQ USAFE RAMSTEIN AB GE//LGSF//

HQ PACAF HICKAM AFB HI//LGSF//

HQ AFRC ROBINS AFB GA//LGSWF//

HQ USCENTAF SHAW AFB SC//A4-LGSF//

HQ AFMC WRIGHT PATTERSON AFB OH//LGSF//

ANGRC ANDREWS AFB MD//LGSF//

82LG SHEPPARD AFB TX//LGS//

366TTS SHEPPARD AFB TX//TSIF//

345TRS LACKLAND AFB TX//TTLO//

HQ AFSOC HURLBURT FLD FL//LGRS//

INFO DIR USAPC NEW CUMBERLAND PA//SATPC-Z//

DIRMETCB FT BELVOIR VA//AMSTA-RBF//

NAVPETOFF FORT BELVOIR VA//NPO//

MSGT STEVEN A. RICHERSON
SA-ALC/SFTH, 5-4617

JUDITH F. VASIL/SFT/56431
CRC:

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121912ZJUN97

02 02 121912Z MONTH JUN 97 RR RR UUUU

ZYUW

NO

UNCLAS

SUBJECT: JP-8+100 GRADE DETERMINATION

REFERENCE: SA-ALC/SFT MSG 201537Z MAY 97, JP-8+100 PROCEDURES

1. JP-8+100 HAS THE POTENTIAL TO DISARM CONVENTIONAL
FILTER COALESCERS. NUMEROUS ACTIVITIES, ESPECIALLY DEPOTS, EXPRESSED
CONCERN WITH PRODUCT GRADE DETERMINATION WHEN DEFUELING AIRCRAFT.
2. THE FOLLOWING FORMULA ENSURES A MANAGEABLE BLEND RATIO.
3. CONSIDER AN AIRCRAFT TO BE USING JP-8+100, UNLESS THE AIRCRAFT
REFUELED 75 PERCENT OF ITS TANK'S CAPACITIES THE LAST THREE
CONSECUTIVE TIMES WITH GRADES OTHER THAN JP-8+100.
4. THIS INFORMATION IS ON THE AF FORM 781F.
5. DISSEMINATE THIS INFORMATION TO YOUR LOWEST LEVEL ACTIVITIES.
6. POC IS MSGT RICHERSON, SA-ALC/SFTH, DSN 945-4610.

MSGT STEVEN A. RICHERSON
SA-ALC/SFTH, 5-4617

JUDITH F. VASIL/SFT/56431
CRC:

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NO

ZYUW SF

SA ALC KELLY AFB TX//SFT//

AIG 10006

114FS KINGSLEY FLD OR//LG/LGM/LGS/LGSF//

102FW OTIS ANGB MA//LG/LGM/LGS/LGSF//

104FG BARNES MUNI APRT WESTFIELD MA//LG/LGM/LGSF//

158FG BURLINGTON IAP VT//LG/LGM/LGS/LGSF//

178FG SPRINGFIELD ANGB OH//LG/LGM/LGS/LGSF//

123AW STANDIFORD FLD KY//LG/LGM/LGS/LGSF//

ANGRC ANDREWS AFB MD//LG/LGM/LGS/LGSF//

82LG SHEPPARD AFB TX//LG/LGSF/CACI FLD SERVICES INC//

82LSS SHEPPARD AFB TX//MAQ//

INFO DFSC CAMERON STATION VA//Q//

SUBJECT: JP-8+100 PROCEDURES

THIS IS A TWO PART MESSAGE. PART ONE FOR ANG ADDRESSES AND SHEPPARD
AFB TX. PART TWO FOR AIG 10006 (ALMAJCOM/LGSF ADDRESSES)
PART ONE.

1. REQUEST ALL ACTIVITIES PARTICIPATING IN THE JP-8+100 TEST
PROGRAM IMPLEMENT THE FOLLOWING PROCEDURES.

A. ANNOTATE THE AIRCRAFT MAINTENANCE RECORD AFTER EACH

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NO

REFUELING TO REFLECT THAT THE AIRCRAFT FUEL SYSTEM CONTAINS

JP-8+100. THIS PROCEDURE IS NECESSARY TO PROVIDE NOTICE TO AIRCRAFT
MAINTENANCE AND TRANSIENT ALERT PERSONNEL SUPPORTING TRANSIENT AND
DISPLAYED

AIRCRAFT. SPECIAL HANDLING OF THE FUEL IS REQUIRED IN THE EVENT OF
DEFUELING.

B. PERFORM ONE TIME DEFUELS OF AIRCRAFT CONTAINING JP-8+100, AT
THE AIRCRAFT HOME STATION, USING AN IN-SERVICE REFUELER AND ISSUE
THE DEFUELED PRODUCT TO ASSIGNED AIRCRAFT REQUIRING JP-8+100.

C. IN THE EVENT DEFUELS EXCEEDS REFUELS, ISSUE JP-8+100 TO THE
ENGINE TEST CELL TANK AND/OR AGE TANK.

D. AS A LAST ALTERNATIVE, RETURN JP-8+100 TO THE BULK STORAGE
JP-8 INVENTORY. FOLLOW THE BLENDING RATIO SPECIFIED IN T.O. 42B-1-1,
TABLE 3-2, FOR MIXED TURBINE FUELS INTO JP-8. THAT IS: BLEND ONE
GALLON OF THE JP-8+100 INTO NO LESS THAN 100 GALLONS OF JP-8 PRODUCT
IN THE BULK TANK.

PART TWO.

2. DEFUEL TRANSIENT OR DEPLOYED AIRCRAFT CONTAINING JP-8+100 USING
AN IN-SERVICE DEFUEL UNIT ONLY WHEN THE QUANTITY OF PRODUCT TO BE
DEFUELED EXCEEDS THE QUANTITY THAT CAN BE CONVENIENTLY DRAINED INTO

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NO

A400 OR 600 GALLON BOWSER.

3. RETURN DEFUELED JP-8+100 PRODUCT TO THE JP-8 BULK INVENTORY USING THE ONE GALLON OF JP-8+100 TO ONE HUNDRED GALLONS OF JP-8 RATIO.

4. THE ADDITIVE USED IN JP-8+100 ACTS QUICKLY TO DISARM STANDARD COALESCER ELEMENTS USED IN REFUELING UNITS. THEREFORE, A

REFUELER SHOULD ONLY BE USED WHEN NECESSARY TO DEFUEL JP-8+100.

AFTER DEFUELING JP-8+100 WITH A REFUELER EQUIPPED WITH NSN

4330-00-983-0998 COALESCERS, THE ELEMENTS SHALL BE CHANGED BEFORE

RETURNING THE REFUELER TO IN-SERVICE USE. REFUELERS UTILIZED AT

JP-8+100 TEST LOCATIONS ARE EQUIPPED WITH VELCON AQUACON ABSORPTION

MEDIA ELEMENTS.

5. PLEASE PASS THIS INFORMATION TO YOUR BASES. THIS IS A WL/POSF

AND SA-ALC/SFTH COORDINATED MESSAGE. POC IS MR FISHBURN, DSN

945-4617.

E.M FISHBURN

SA-ALC/SFTH, 5-4617

JAMES P. VASIL/ACT CH/SFT/56431

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